SILVERSTONE®
Designing Inspiration

ZEUS

ST65ZF

The benchmark of stability and power

Class-leading continuous 42A Quad +12V combined output @ 50℃
Four PCI-E 6pin connectors
Industrial class components
Support for ATX 12V 2.01 & EPS12V
Active PFC

SPECIFICATION

SilverStone Zeus ST65ZF active PFC power supply

This specification describes the requirements of 650Watts switching power supply with an stretch form-factor and EPS12V, +5V standby voltage, remote on/off control, dual line input capability and forced air cooling characteristics .

1. AC INPUT

1.1 AC input requirements

The input voltage, current, and frequency requirements for continuous operation are stated below.

Parameter	Min.	Nom.	Max.	Unit
Vin(Full range)	103	115 - 240	264	VACrms
Vin Frequency	47	60 - 50	63	Hz
Iin		10 - 5		Arms

Power factor correction (PF)>0.95 at full load

Table 1 AC Input Line Requirements

1.2 Inrush current regulation

50 A @ 115Vrms
100 A @ 230Vrms (at 258C ambient cold start)

2. DC OUTPUT

2.1 DC voltage regulation

Parameter	Range	Min.	Nom.	Max.	Unit
+3.3V	+/-5%	+3.14	+3.3	+3.47	Volts
+5V	+/-5%	+4.75	+5	+5.25	Volts
+12V1	+/-5%	+11.4	+12	+12.6	Volts
+12V2	+/-5%	+11.4	+12	+12.6	Volts
+12V3	+/-5%	+11.4	+12	+12.6	Volts
+12V4	+/-5%	+11.4	+12	+12.6	Volts
-12V	+/-10%	-10.8	-12	-13.2	Volts
+5VSB	+/-5%	+4.75	+5	+5.25	Volts

2.2 Load ranges

2.2.1 : (650 Watts Load Ratings-Dual +12V Rails for processor Power)

Load Range 1

Parameter	Min.	Nom.	Max.	Unit
+3.3V	1.5	-	33	Amps
+5V	5.0	-	24	Amps
+12V1	1.5	-	18	Amps
+12V2	1.5	-	18	Amps
+12V3	1.5	-	18	Amps
+12V4	1.5	-	18	Amps
-12V	0	-	0.5	Amps
+5VSB	0.1	-	2.0	Amps

Load Range 2

Parameter	Min.	Nom.	Max.	Unit
+3.3V	0.5	-	9	Amps
+5V	2.0	-	7	Amps
+12V1	0.5	-	5.0	Amps
+12V2	0.5	-	4.0	Amps
+12V3	0.5	-	6.0	Amps
+12V4	2.0	-	5.0	Amps
-12V	0.0	-	0.5	Amps
+5VSB	0.1	-	2.0	Amps

Notes:

(1) The maximum continuous total DC outputs power shall not exceed 650W

(2) The maximum continuous load on +5V and +3.3V outputs shall not exceed 170W.

(5) The maximum combined current for the +12V outputs shall be 42A, peak load 45A

(6) The 5V standby output shall remain on while the AC input power connected, whether DC outputs are disabled (Off) or enabled (On) by the remote on control signal, but when the 5V Standby output remained on with the AC input power turn off, the remote on control will be disabled.

(7) The total peak load is 710W for 10 second.

2.3 Output Ripple

2.3.1 Ripple regulation

Parameter	Ripple & Noise	Unit
+3.3V	100	mVp-p
+5V	100	mVp-p
+12V1	150	mVp-p
+12V2	150	mVp-p
+12V3	150	mVp-p
+12V4	150	mVp-p
-12V	150	mVp-p
+5VSB	100	mVp-p

2.3.2 Definition

The ripple voltage of the outputs shall be measured at the pins of the output connector when terminated in the load impedance specified in figure 1. Ripple and noise are measured at the connectors with a 0.1uF ceramic capacitor and a 10uF electrolytic capacitor to simulate system loading. Ripple shall be measured under any condition of line voltage, output load, line frequency, operation temperature.

2.3.3 Ripple voltage test circuit

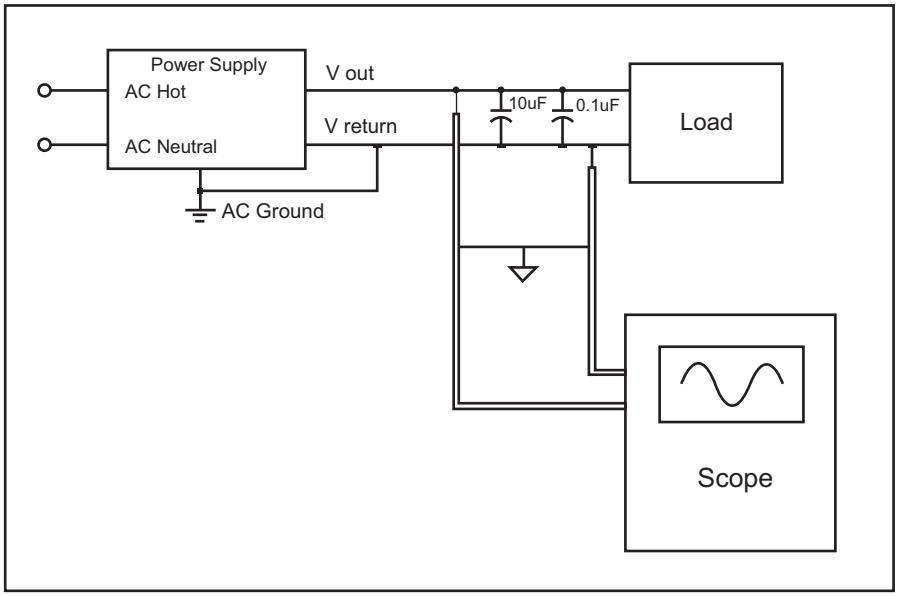

Figure 1. Ripple voltage test circuit

2.4 Overshoot

Any overshoot at turn on or turn off shall be less 10% of the normal voltage value, all outputs shall be within the regulation limit of section 2.0 before issuing the power good signal of section 5.0

2.5 Efficiency

75.8% maximum

2.6 Remote ON/OFF control

When the logic level "PS-ON" is low, the DC outputs are to be enabled.

When the logic level is high or open collector, the DC outputs are to be disabled.

3. PROTECTION

3.1 Over current protect

The power supply shall have current limit to prevent the +3.3V, +5V, and +12V1, +12V2,+12V3 outputs from exceeding the values shown in the following Table. If the current limits are exceeded the power supply shall shutdown and latch off.

Dual +12V for processor (650W)

Voltage	Over Current Limit (Iout limit)
+12V1	18A minimum; 20A maximum
+12V2	18A minimum; 20A maximum
+12V3	18A minimum; 20A maximum
+12V4	18A minimum; 20A maximum
+5V	26A minimum; 40A maximum
+3.3V	36A minimum; 50A maximum

3.2 Under voltage protection.

In an under voltage fault occurs, the supply will latch all DC outputs into a shutdown state when +5V & +3.3V outputs under 85% of its maximum value.

3.3 Over voltage protection

The over voltage sense circuitry and reference shall reside in packages that are separate and distinct from the regulator control circuitry and reference. No single point fault shall be able to cause a sustained over voltage condition on any or all outputs. The supply shall provide latch-mode over voltage protection as defined in Table.

Output	Minimum	Nominal	Maximum	Unit
+12 VDC	13.4	15.0	15.6	Volts
+5 VDC	5.74	6.3	7.0	Volts
+3.3 VDC	3.76	4.2	4.3	Volts

3.4 Short circuit

An output short circuit is defined as any output impedance of less than 0.1 ohms. The power supply shall shut down and latch off for shorting the +3.3 VDC, +5 VDC,or+12 VDC rails to return or any other rail. Shorts between main output rails and +5VSB shall not cause any damage to the power supply. The power supply shall either shut down and latch off or fold back for shorting the negative rails.+5VSB must be capable of being shorted indefinitely, but when the short is removed, the power supply shall recover automatically or by cycling PS_ON#. The power supply shall be capable of withstanding a continuous short-circuit to the output without damage or overstress to the unit

3.5 No load operation

No damage or hazardous condition should occur with all the DC output connectors disconnected from the load. The power supply may latch into the shutdown state.

4. TIMING

4.1 Signal timing drawing

Figure 2. is a reference for signal timing for main power connector signals and rails

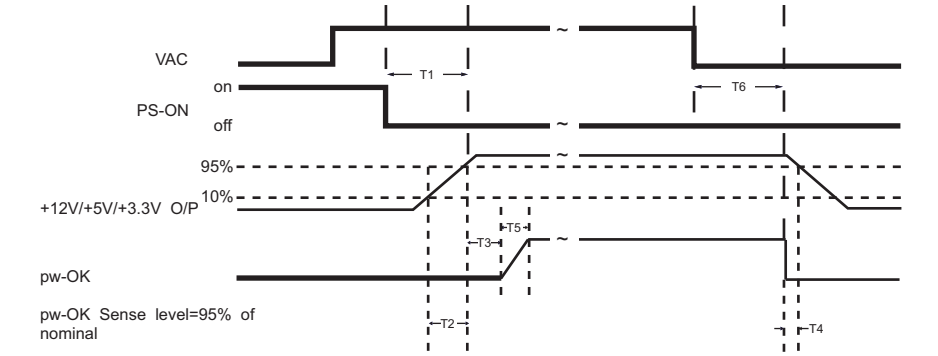

Figure 2. PS-OK Timing Sequence

(1) T2: Rise time (0.1ms~70ms)
(2) T3: Power good signal turn on delay time (100ms~1000ms)
(3) T4: Power good signal turn off delay time (1ms min)
(4) T5: Rise time (10ms max)
(5) T6: Hold up time (17ms min)

4.2 Hold up time

When the power loss its input power, it shall maintain 17ms in regulation limit at normal input voltage (AC:115V/60Hz or 230V/50Hz)

5. ENVIRONMENT

5.1 Operation

Temperature	0 to 508C
Relative Humidity	10 to 90%, non-condensing

5.2 Shipping and Storage

Temperature	-20 to 608C
Relative Humidity	5 to 90%, non-condensing

5.3 Altitude

Operating	10,000FT max
Storage	50,000FT max

6. SAFETY

6.1 Underwriters Laboratory (UL) recognition..

The power supply designed to meet UL 1950.

6.2 The power supply must bear the German Bauart Mark from TUV.

7. ELECTROMAGNETIC COMPATIBILITY (EMC)

7.1 IEC 1000-4-2 ESD LEVEL X20KV4.
7.2 IEC 1000-4-3 radiated electrical field requirement.
7.3 IEC 1000-4-4 BURST
7.4 IEC 1000-4-5 surge Voltages
7.5 EN61000-3-2 harmonic current emissions.
If applicable to sales in Japan or Europe, the power supply shall meet the requirements of EN 61000-3-2 class D and the guidelines for the suppression of harmonics in appliances and general use equipment class D for harmonic line current content at full-rated power.
7.6 EN55024 class B radio interference (CISPR 22)
7.7 FCC part 15, subpart J class B 115VAC operation.

8. MTBF

8.1 MTBF (mean time between failures) calculation

The demonstrated MTBF shall be 100,000 hours of continuous operation at 258C, full load, 80% confidence limit and nominal line. The MTBF of the power supply be calculated in accordance with MIL-HDBK-217F. The DC FAN is not included.

9. MECHANICAL REQUIREMENTS

9.1 Physical dimension

150 x 86 x 180 mm (W x H x D)

9.2 Net weight

2.7 kg

9.3 Connectors & cable length

Connector	Quantity	Length (mm)
M/B 24 Pin	1	550
EPS 12V /8 pin	1	550
EPS 12V /6 pin	1	550
P4 12V /4 Pin (8 to 4 Pin)	1	150
PCI Express / 6pin	2x2	550 / 150
SATA / 5 pin	2x2	500 / 250
HDD / 4 pin	3x2	500 / 250 / 150
FDD / 4 pin	2x1	500 / 250 / 150 / 150

9.3 Pin definition

M/B 24PIN connector

16AWG wire	Signal	Pin	Pin	Signal	16AWG wire
Orange	+3.3V	**13**	**1**	+3.3V	Orange
Orange(22AWG)	+3.3Vsense	**13**			
Blue (18AWG)	-12VDC	**14**	**2**	+3.3V	Orange
Black	COM	**15**	**3**	COM	Black
Green(20AWG)	PS-ON	**16**	**4**	+5VDC	Red
Black	COM	**17**	**5**	COM	Black
Black	COM	**18**	**6**	+5VDC	Red
Black	COM	**19**	**7**	COM	Black
N/C	N/C	**20**	**8**	PWRGOOD	Grey (20AWG)
Red	+5VDC	**21**	**9**	+5Vsb	Purple(18AWG)
Red	+5VDC	**22**	**10**	+12V3	Yellow/Blue stripe
Red	+5VDC	**23**	**11**	+12V3	Yellow/Blue stripe
Black	COM	**24**	**12**	+3.3V	Orange

4PIN molex connector (HDD) **4PIN floppy connector (FDD)**

18AWG wire	Signal	Pin	Pin	Signal	22AWG wire
Yellow/Green stripe	+12V4	**1**	**1**	+5VDC	Red
Black	COM	**2**	**2**	COM	Black
Black	COM	**3**	**3**	COM	Black
Red	+5VDC	**4**	**4**	+12V4	Yellow/Green stripe

SATA connector

18AWG wire	Signal	Pin
Orange	+3.3V	5
Black	GND	4
Red	+5V	3
Black	GND	2
Yellow	+12V2	1

EPS 12V 8PIN Connector

18AWG wire	Signal	Pin	Pin	Signal	18AWG wire
Yellow/Black stripe	+12V1	5	1	COM	Black
Yellow/Black stripe	+12V1	6	2	COM	Black
Yellow	+12V2	7	3	COM	Black
Yellow	+12V2	8	4	COM	Black

EPS 12V 6PIN Connector

18AWG wire	Signal	Pin	Pin	Signal	18AWG wire
Orange	+3.3V	1	4	GND	Black
Orange	+3.3V	2	5	GND	Black
Yellow	+12V2	3	6	Yellow	+12V2

6PIN PCI Express Connector 1 & 2

18AWG wire	Signal	Pin	Pin	Signal	18AWG wire
Yellow/Blue	+12V3	1	4	GND	Black
Yellow/Blue	+12V3	2	5	GND sense	Black
Yellow/Blue	+12V3	3	6	GND	Black

6PIN PCI Express Connector 3 & 4

18AWG wire	Signal	Pin	Pin	Signal	18AWG wire
Yellow/Green	+12V4	1	4	GND	Black
Yellow/Green	+12V4	2	5	GND sense	Black
Yellow/Green	+12V4	3	6	GND	Black

Taiwan Headquarters
SilverStone Technology Co., Ltd.
18F~8, No. 738 Chung-Cheng Rd.
Chung-Ho City, Taipei Hsien,
Taiwan R.O.C. 235
Tel: 886-2-8227-8222
Fax: 886-2-8227-3015
info@silverstonetek.com
www.silverstonetek.com.tw

USA Branch Office (North/Central/South America Logistic Center)
SilverStone Technology Inc.
20885 Currier Road
City of Industry , CA 91789
Tel: 909-598-2318
Fax: 909-598-2518
alex@silverstonetek.com
www.silverstonetek.com

Europe Logistic Center
SilverStone Technology GmbH
Schierenberg 68
D-22145 Hamburg Germany
Tel: 49-40-675931-0
Fax: 49-40-675931-66
sales@silverstonetek.de
www.silverstonetek.de

SilverStone Technology Co., Ltd.

www.silverstonetek.com

support@silverstonetek.com
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